

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form ~~PTO~~ ~~PTO~~ ~~PTO~~

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

Sheet 1 of 5

Complete if Known

Application Number	09/638,485
Filing Date	August 14, 2000
First Named Inventor	Charles J. JACOBUS
Group Art Unit	2837
Examiner Name	Tyrone W. Smith
Attorney Docket Number	IMM069D

17/TS
JACOBUS
8/21/03

U.S. PATENT DOCUMENTS

Examiner	Cite No. ¹	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number Kind Code ² (if known)			
TS	AA	3,220,121	11/30/1965	Cutler	
TS	AB	3,517,446	6/30/1970	Corlyon et al.	
TS	AC	3,903,614	9/9/1975	Diamond et al.	
TS	AD	4,236,325	10/2/1980	Hall et al.	
TS	AE	4,513,235	4/23/1985	Acklam et al.	
TS	AF	4,599,070	7/8/1986	Hladky et al.	
TS	AG	4,708,656	11/24/1987	De Vries et al.	
TS	AH	4,713,007	12/15/1987	Alban	
TS	AI	4,891,764	1/2/1990	McIntosh	
TS	AJ	5,019,761	5/28/1991	Kraft	
TS	AK	5,022,407	6/11/1991	Horch et al.	
TS	AL	5,240,417	8/31/1993	Smithson et al.	
TS	AM	5,271,290	12/21/1993	Fischer	
TS	AN	5,275,174	1/4/1994	Cook	
TS	AO	5,785,630	7/28/1998	Bobick et al.	
TS	AP	3,157,853	11/17/1964	Hirsch	
TS	AQ	3,497,668	2/24/1970	Hirsch	
TS	AR	3,902,687	6/25/1973	Hightower	
TS	AS	4,160,508	7/10/1979	Salsbury	
TS	AT	4,581,491	4/8/1986	Boothroyd	
TS	AU	4,930,770	6/5/1990	Baker	
TS	AV	4,934,694	6/19/1990	McIntosh	
TS	AW	5,035,242	7/30/1991	Franklin	
TS	AX	5,038,089	8/6/1991	Szakaly	
TS	AY	5,078,152	1/7/1992	Bond	
TS	AZ	5,299,810	4/5/1994	Pierce	
TS	BA	5,309,140	5/3/1994	Everett	
TS	BB	5,334,027	8/2/1994	Wherlock	
TS	BC	5,547,382	8/20/1996	Yamasaki	
TS	BD	5,212,473	5/18/1993	Louis	
TS	BE	5,466,213	11/14/1995	Hogan	
TS	BF	5,766,016	6/16/1998	Sinclair	
TS	BG	5,186,685	2/16/1993	Mangseth et al.	
TS	BH	6,422,941	7/23/2002	Thorner et al.	
TS		6,111,577	8/29/2000	Zilles et al.	

Examiner
Signature

Tyrone W. Smith

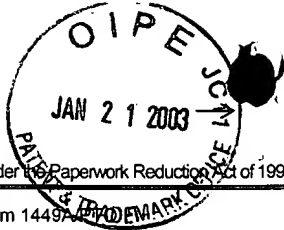
Date
Considered

3/20/03

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ Applicant's unique citation designation number (optional). ² Kinds of U.S. Patent Documents at www.uspto.gov or MPEP 901.04. ³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. ⁶ Applicant is to place a check mark here if English language Translation is attached.

Burden Hour Statement: This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231



PTO/SB/08A (10-01)

Approved for use through 10/31/2002. OMB 0651-0031

U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number

Substitute for form 1449A (10-01)

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**

(use as many sheets as necessary)

Sheet 2 of 5

Complete if Known

Application Number	09/638,485
Filing Date	August 14, 2000
First Named Inventor	Charles J. JACOBUS
Group Art Unit	2837
Examiner Name	Tyrone W. Smith
Attorney Docket Number	IMM069D

Examiner Initials*	Cite No. ¹	Foreign Patent Document			Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Country Code ²	Number ⁴	Kind Code ³ (if known)			
TS	BI	EP	EP0349086		1/31/1990	Visser	

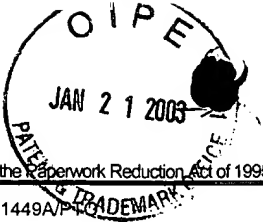
Examiner
SignatureDate
Considered

3/20/03

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ Applicant's unique citation designation number (optional). ² Kinds of U.S. Patent Documents at www.uspto.gov or MPEP 901.04. ³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. ⁶ Applicant is to place a check mark here if English language Translation is attached.

Burden Hour Statement: This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231



Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449A/P

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**

(use as many sheets as necessary)

Sheet 3 of 5

Complete if Known

Application Number	09/638,485
Filing Date	August 14, 2000
First Named Inventor	Charles J. JACOBUS
Group Art Unit	2837
Examiner Name	Tyrone W. Smith
Attorney Docket Number	IMM069D

OTHER PRIOR ART -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials *	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
TS	BJ	BAIGRIE, "Electric Control Loading -- A Low Cost, High Performance Alternative," Proceedings, pp. 247-254, November 6-8, 1990.
TS	BK	IWATA, "Pen-based Haptic Virtual Environment," 0-7803-1363-1/93 IEEE, pp 287-292, 1993.
TS	BL	RUSSO, "The Design and Implementation of a Three Degree of Freedom Force Output Joystick," MIT Libraries Archives 08/14/1990, pp. 1-131, May 1990.
TS	BM	BROOKS et al., "Hand Controllers for Teleoperation -- A State-of-the-Art Technology Survey and Evaluation," JPL Publication 85-11; NASA-CR-175890; N85-28559, pp. 1-84, 03/1/1985.
TS	BN	JONES et al., "A perceptual analysis of stiffness," ISSN 0014-4819 Springer International (Springer-Verlag); Experimental Brain Research, Vol. 79, No. 1, pp. 150-156, 1990.
TS	BO	BURDEA et al., "Distributed Virtual Force Feedback, Lecture Notes for Workshop on Force Display in Virtual Environments and its Application to Robotic Teleoperation," 1993 IEEE International Conference on Robotics and Automation, pp. 25-44, 05/02/1993.
TS	BP	SNOW et al., "Model-X Force-Reflecting-Hand-Controller," NT Control no. MPO-17851; JPL Case No. 5348, pp. 1-4, 06/15/1989.
TS	BQ	OUH-YOUNG, "Force Display in Molecular Docking," Order No. 9034744, p. 1-369, 1990.
TS	BR	TADROS, "Control System Design for a Three Degree of Freedom Virtual Environment Simulator Using Motor/Brake Pair Actuators, MIT Archive@ Massachusetts Institute of Technology, pp. 1-88, February 1990.
TS	BS	CALDWELL et al., "Enhanced Tactile Feedback (Tele-Traction) Using a Multi-Functional Sensory System," 1050-4729/93, pp. 955-960, 1993.
TS	BT	ADELSTEIN, "Design and Implementation of a Force Reflecting Manipulandum for Manual Control research," DSC-Vol. 42, Advances in Robotics, Edited by H. Kazerooni, pp. 1-12, 1992.
TS	BU	GOTOW et al, "Controlled Impedance Test Apparatus for Studying Human Interpretation of Kinesthetic Feedback," WA11-11:00, pp. 332-337
TS	BV	STANLEY et al., "Computer Simulation of Interacting Dynamic Mechanical Systems Using Distributed Memory Parallel Processors," DSV-Vol. 42, Advances in Robotics, pp. 55-61, ASME 1992.
TS	BW	RUSSO, "Controlling Dissipative Magnetic Particle Brakes in Force Reflective Devices," DSC-Vol. 42, Advances in Robotics, pp. 63-70, ASME 1992.

Examiner
SignatureDate
Considered

3/20/03

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ Applicant's unique citation designation number (optional). ² Kinds of U.S. Patent Documents at www.uspto.gov or MPEP 901.04. ³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. ⁶ Applicant is to place a check mark here if English language Translation is attached.

Burden Hour Statement: This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231

JAN 21 2003

PTO/SB/08A (10-01)

Approved for use through 10/31/2002. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449A PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

Sheet 4 of 5

Complete if Known

Application Number	09/638,485
Filing Date	August 14, 2000
First Named Inventor	Charles J. JACOBUS
Group Art Unit	2837
Examiner Name	Tyrone W. Smith
Attorney Docket Number	IMM069D

OTHER PRIOR ART -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials *	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	
TS	BX	KONTARINIS et al., "Display of High-Frequency Tactile Information to Teleoperators," Telemanipulator Technology and Space Telerobotics, Won S. Kim, Editor, Proc. SPIE Vol. 2057, pp. 40-50, Sep. 7-9, 1993.	
TS	BY	PATRICK et al., "Design and Testing of A Non-reactive, Fingertip, Tactile Display for Interaction with Remote Environments," Cooperative Intelligent Robotics in Space, Rui J. deFigueiredo et al., Editor, Proc. SPIE Vol. 1387, pp. 215-222, 1990.	
TS	BZ	ADELSTEIN, "A Virtual Environment System For The Study of Human Arm Tremor," Ph.D. Dissertation, Dept. of Mechanical Engineering, MIT, June 1989.	
TS	CA	BEJCZY, "Sensors, Controls, and Man-Machine Interface for Advanced Teleoperation," Science, Vol. 208, No. 4450, pp. 1327-1335, 1980.	
TS	CB	BEJCZY, "Generalization of Bilateral Force-Reflecting Control of Manipulators," Proceedings Of Fourth CISM-IFTOMM, Sep. 8-12, 1981.	
TS	CC	MCAFFEE, "Teleoperator Subsystem/Telerobot Demonstrator: Force Reflecting Hand Controller Equipment Manual," JPL D-5172, pp. 1-50, A1-A36, B1-B5, C1-C36, January 1988.	
TS	CD	MINSKY, "Computational Haptics: The Sandpaper System for Synthesizing Textue for a Force-Feedback Display," Ph.D. Dissertation, MIT, June 1995.	
TS	CE	JACOBSEN et al., "High Performance, Dextrous Telerobotic Manipulator With Force Reflection," Intervention/ROV '91 Conference & Exposition, Hollywood, Florida, May 21-23, 1991.	
TS	CF	SHIMOGA, "Finger Force and Touch Feedback Issues in Dexterous Telemanipulation," Proceedings of Fourth Annual Conference on Intelligent Robotic Systems for Space Exploration, Rensselaer Polytechnic Institute, Sep. 30 - Oct. 1, 1992.	
TS	CG	IBM Technical Disclosure Bulletin, "Mouse Ball-Actuating Device With Force and Tactile Feedback," Vol. 32, No. 9B, February 1990.	
TS	CH	TERRY et al., "Tactile Feedback In A Computer Mouse," Proceedings of Fourteenth Annual Northeast Bioengineering Conference, University of New Hampshire, March 10-11, 1988.	
TS	CI	HOWE, "A Force-Reflecting Teleoperated Hand System for the Study of Tactile Sensing in Precision Manipulation," Proceedings of the 1992 IEEE International Conference on Robotics and Automation, Nice, France, May 1992.	
TS	CJ	EBERHARDT et al., "OMAR -- A Haptic display for speech perception by deaf and def-blind individuals," IEEE Virtual Reality Annual International Symposium, Seattle, WA, Sep. 18-22, 1993.	
TS	CK	RABINOWITZ et al., "Multidimensional tactile displays: Identification of vibratory intensity, frequency, and contractor area," Journal of The Accoustical Society of America, Vol. 82, No. 4, October 1987.	

Examiner Signature

Tyrone W. Smith

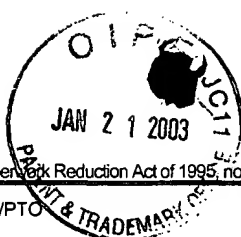
Date Considered

3/20/03

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ Applicant's unique citation designation number (optional). ² Kinds of U.S. Patent Documents at www.uspto.gov or MPEP 901.04. ³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. ⁶ Applicant is to place a check mark here if English language Translation is attached.

Burden Hour Statement: This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231



Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

Sheet 5 of 5

Complete if Known

Application Number	09/638,485
Filing Date	August 14, 2000
First Named Inventor	Charles J. JACOBUS
Group Art Unit	2837
Examiner Name	Tyrone W. Smith
Attorney Docket Number	IMM069D

OTHER PRIOR ART -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials *	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
TS	CL	BEJCZY et al., "Kinesthetic Coupling Between Operator and Remote Manipulator," International Computer Technology Conference, The American Society of Mechanical Engineers, San Francisco, CA, August 12-15, 1980.
TS	CM	BEJCZY et al., "A Laboratory Breadboard System For Dual-Arm Teleoperation," SOAR '89 Workshop, JSC, Houston, TX, July 25-27, 1989.
TS	CN	OUH-YOUNG, "A Low-Cost Force Feedback Joystick and Its Use in PC Video Games," IEEE Transactions on Consumer Electronics, Vol. 41, No. 3, August 1995.
TS	CO	MARCUS, "Touch Feedback in Surgery," Proceedings of Virtual Reality and Medicine The Cutting Edge, Sep. 8-11, 1994.
TS	CP	BEJCZY, et al., "Universal Computer Control System (UCCS) For Space Telerobots," CH2413-3/87/0000/0318501.00 1987 IEEE, 1987.
TS	CQ	AUKSTAKALNIS et al., "Silicon Mirage: The Art and Science of Virtual Reality," ISBN 0-938151-82-7, pp. 129-180, 1992.
TS	CR	EBERHARDT et al., "Including Dynamic Haptic Perception by The Hand: System Description and Some Results," DSC-Vol. 55-1, Dynamic Systems and Control: Volume 1, ASME 1994.
TS	CS	GOBEL et al., "Tactile Feedback Applied to Computer Mice," International Journal of Human-Computer Interaction, Vol. 7, No. 1, pp. 1-24, 1995.
TS	CT	PIMENTEL et al., "Virtual Reality: through the new looking glass," 2 nd Edition; McGraw-Hill, ISBN 0-07-050167-X, pp. 41-202, 1994.
TS	CU	"Cyberman Technical Specification," Logitech Cyberman SWIFT Supplement, 4/5/1994.
TS	CV	OUHYOUNG et al., "The Development of A Low-Cost Force Feedback Joystick and Its Use in the Virtual Reality Environment," Proceedings of the Third Pacific Conference on Computer Graphics and Applications, Pacific Graphics '95, Seoul, Korea, 21-24 August 1995.
TS	CW	KACZMAREK et al., "Tactile Displays," Virtual Environment Technologies.

Examiner
Signature

Date
Considered

3/20/03

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ Applicant's unique citation designation number (optional). ² Kinds of U.S. Patent Documents at www.uspto.gov or MPEP 901.04. ³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. ⁶ Applicant is to place a check mark here if English language Translation is attached.

Burden Hour Statement: This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231